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Climate policy innovation in the South – domestic and international determinants of renewable energy policies in developing and emerging countries

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Abstract

This article attempts to disentangle the determinants of the adoption of renewable energy support policies in developing and emerging countries. By analyzing policies already implemented in industrialized countries, we focus on the diffusion but not the invention of climate-relevant policies. We look at four different types of policies (renewable energy targets, feed-in tariffs, other financial incentives and framework policies) and consider both domestic factors and international diffusion mechanisms utilizing a discrete-time events history model with a logit link on a self-compiled dataset of grid-based electricity policy adoption in 112 developing and emerging countries from 1998 to 2009. In general, we find stronger support for the domestic determinants of policy adoption, but also substantial influence of international factors. Countries with a larger population and more wealth have a higher probability of adopting renewable energy policies. Only in some specific cases do natural endowments for producing renewable energy encourage governments to adopt policies, and hydro power resources even correlate negatively with the adoption of targets. Among the international determinants, emulation from colonial peers and membership within the EU seem to facilitate policy adoption. International climate finance is less relevant, as the Global Environmental Facility and the Clean Development Mechanism may only increase the adoption of frameworks and targets, but they have no influence on tariffs and incentives.

Keywords
Renewable energy; Policy diffusion; Policy innovation; Developing countries; Climate policy

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Climate policy innovation in the South - domestic and international determinants of renewable energy policies in developing and emerging countries

1. Introduction

Energy generation and use is one of the most important global sources of greenhouse gas (GHG) emissions. Electricity and heat production accounted for 28% of global emissions in 2005 (WRI, 2012). Renewable energy (RE) is increasingly considered by policy-makers as a key energy form to support and pursue, not only to prevent climate change, but also to improve energy security, reduce local air pollution and generate employment (Mitchell et al., 2011). In addition, as Jordan and Huitema (forthcoming) point out in the introduction to this special issue, the sustained failure to reach an effective international agreement to tackle climate change is resulting in a shift of attention – and of expectations – towards national-level policy-making. For these reasons, in this article we focus on the national adoption of policies that support RE electricity generation.

There is a growing body of literature that focuses on the international diffusion and national adoption of policies that financially support or otherwise promote the deployment of RE, such as feed-in tariffs (FITs), renewable portfolio standards or tax credits. Most of the empirical literature, however, looks at industrialized countries or at subnational units in industrialized countries (Huang et al., 2007; Jacobs, forthcoming; Matisoff, 2008; Vachon and Menz, 2006). Empirical work on RE policies in developing countries mostly focuses on the policies' impact (Lewis and Wiser, 2007; Wang et al., 2010; Yu et al., 2009), whereas literature on policy adoption is limited to few case studies (e.g. Benecke, 2009). We are not aware of literature that looks at policy diffusion in the area of RE in developing countries, even though recent literature has emphasized the role of international competition in the related field of carbon capture and storage (Roman, 2011).

However, knowing the determinants that encourage developing and emerging[1] country governments to adopt RE policies is very important from an international climate policy perspective; they already generate more than half of global GHG emissions, will substantively expand their power generation facilities in the next few decades and are, therefore, projected to contribute more than 70% of energy-related GHG missions by 2035 (IEA, 2010). Whether policy adoption determinants are the same as in industrialized countries is questionable, given the difference in political systems, international commitments to mitigate climate change, and economic development. For instance, the rapid growth in emerging economies at a time of high oil prices may have encouraged the search for alternative energy forms. Furthermore, less affluent countries may need international financial and capacity building support to implement RE technologies with high investment costs. Therefore, we can expect that international climate finance, both from public sources and the carbon market will help to set up new policies. If we find such an effect, then we can argue that the international community has effective tools to promote national-level policy development in support of climate change mitigation in developing and emerging countries, and this can in turn inform the scholarly debate on international climate change governance. However, according to our knowledge, all these potential differences between developing and developed country policy adoption have not yet been analyzed.

This article starts filling this research gap by analysing the reasons why developing and emerging countries adopt RE support policies. Policies are understood here as national-level public policies, i.e. government decisions (Dye, 1972) on goals or means (Jenkins, 1978). Among the three aspects of climate policy innovation - invention, diffusion and impact of climate policies (Jordan and Huitema, forthcoming), we focus on the diffusion of policies already in place in other countries, as most of the RE policies observed in developing countries have been invented in the North (REN21, 2007). Thereby, we follow Walker's concept of *policy innovation* as *first-time adoption of a policy in a country* (Walker, 1969, p. 881). Walker's policy innovation concept of one-time legislative adoption is of course a simplication, as policies are composed of a set of interrelated decisions (Jenkins, 1978). In reality, only the core concepts of policies may be diffused – e.g. the guaranteed electricity tariff in the case of FITs (Jacobs, forthcoming) –, while their details – e.g. the actual level of the FIT – are elaborated in a domestic decision process. Therefore, our study can only capture the diffusion process of policies' core features, while the actual adaptation of policies to the country context would have to be studied by case studies.

Our focus on diffusion rather than invention enables the analysis of RE policies that have already proven to facilitate substantial deployment of RE in the North (e.g. feed-in tariffs). Further advantages are that diffusion processes cover a larger part of developing nations and GHG emissions, and that we can measure the impact of international financial assistance, which will rather promote diffusion of Northern policies and not Southern inventions. As downside, our analysis neglects that developing countries can also be relevant inventors of RE policies, see e.g. the Brazilian Alcohol Program (Moreira and Goldemberg, 1999), so our analysis will not capture the full set of RE policies but only the ones that diffuse after having been adopted in developed countries.

Following Berry and Berry (2007), we assess whether it is mostly domestic factors that drive adoption – dependence on increasingly expensive fossil fuels, concerns about air pollution, environmental pressure groups, socio-economic and institutional factors –, or whether international policy diffusion mechanisms also play a role. We consider that both mechanisms of horizontal diffusion (between countries) and vertical diffusion (from the international to the national level) could be at play. These international diffusion channels may be linked to the diffusion mechanisms outlined in the literature: emulation, learning, coercion (including financial incentives) and competition (Dobbin et al., 2007; Shipan and Volden, 2008; Simmons et al., 2006). Policies could be emulated or learned from neighbouring countries or countries within the same region, with similar cultural, economic and historical background. Diffusion among economic peers, particularly countries within the same trade bloc, may also evidence competition. Furthermore, diffusion may also be enabled by learning and financial incentives connected to international public finance and the carbon market. Disentangling these different diffusion mechanisms is however challenging, particularly in a large-N setting as the one we apply in this article, as several of them can take place simultaneously. Hence, while we follow the existing literature in discussing what mechanisms could be driving the observed diffusion of RE policies, we cannot test with our data which mechanism has actually taken place.

These potential effects are tested using a panel dataset of RE support policies in 163 developing countries over the period from 1998 to 2009. We use a discrete time event history model with a logit link for estimating the probability of policy adoption of four selected policy types (RE targets, FITs, other financial incentives and policy frameworks), including time fixed effects to model the baseline hazard of adopting a policy.

We start the paper by giving an overview of RE policies in developing countries in Section 2. In Section 3 we provide a theoretical framework for RE policy adoption, adapted to developing and emerging countries, and derive hypotheses. After lining out the empirical strategy and operationalization in Sections 4 and 5, we present and discuss the results (Section 6), draw conclusions and propose directions for further research (Section 7).

2. RE support policies in developing countries: A brief overview

Different types of domestic policies can help to overcome the various barriers that prevent the diffusion of RE technologies. Research and development and other technology-push policies are used for fostering innovations and long-term cost reductions in RE. Broader electricity-sector restructuring policies, including the liberalization of the sector, the regulation of access to transmission and distribution grids and the admittance of independent power producers, may also affect RE deployment, depending on their design (Kozloff, 1998; Martinot, 2002).

The focus of this article is on policies directly promoting market growth of grid-based power generation by RE technologies. We have compiled a dataset of RE policies using data from different sources covering the years 1998 to 2009 organizations (e.g. EBRD, 2011; IEA, 2011a; REEEP, 2011; REN21, 2011). From the 163 analysed developing and emerging countries, of which 21 are European economies in transition (see Table S1 in the Supplementary Appendix for a full list of countries included in the analysis), 112 have some sort of policy or strategy to incentivize renewable power generation. The most common policies are targets, framework policies, the provision of incentives through tax reductions or subsidies, and FITs (see Table 1).

(Table 1 about here)

In our analysis, we will focus on the four policy types that have diffused most: RE targets, framework policies, FITs and financial incentives (grants, concessional loans and tax reductions). As Matisoff and Edwards (forthcoming), we consider that different mechanisms may drive the adoption and the diffusion of different types of policies, thus the comparison across these four policies. Two of these policy types provide financial support (FITs and financial incentives), while the other two (targets and framework policies) are general strategies or guidelines. By analysing different policy types, we take into account new insights that policy innovation is not just dependent on the characteristics of the adopting actors but also on the characteristics of the policy itself (see Jordan and Huitema, forthcoming).

Case studies have shown that domestic factors (e.g. the possibility of developing a new industry, generating employment and providing affordable energy) are a very important driver of RE policies in developing countries (Mitchell et al., 2011, p. 879). However, the wide array of policies and the considerable variation in patterns of adoption shown in Table 1 are an indication that not only domestic interests may drive policy adoption, but also external factors such as emulation and learning from peers, incentives provided by international climate policy initiatives or other policy diffusion mechanisms. Thus, in this study we aim at analysing more systematically when, where and why new policies to support RE emerge in developing countries.

3. Policy adoption, innovation and diffusion: Theoretical background

As has been shown in Table 1, in recent years more and more developing countries have adopted one or various policies to support the development of RE. In agreeing with the mainstream literature in the field, in this paper we consider that a policy innovation takes place whenever a country adopts a new policy for the first time, even if such a policy already exists in other countries (Walker, 1969, p. 881). This allows us to consider both internal (domestic) determinants of policy adoption and external (international) diffusion mechanisms.

By both considering internal and external determinants, we follow the suggestion by Berry and Berry (2007) that a fully developed policy diffusion model cannot rely on internal or external covariates only; an approach also suggested by Tews (2005) for studying environmental policy diffusion. While we are aware that internal and external determinants may overlap (e.g. international public finance may only flow if domestic governments ask for support), we are separating them here conceptually as far as possible.

Several theories seek to explain which factors affect the adoption of public policies. Environmental studies discuss environmental and resource pressures (Lester et al., 1983; Ringquist, 1994); developmentalists argue that socio-economic factors determine the scope of policy outputs and outcomes that are possible; institutionalist approaches posit that the political institutions and organizations in the country structure such policy decisions; public choice theory emphasizes the role of preferences and interests of different actors; sociological perspectives and policy diffusion theories underscore the role of formal and informal relationships and networks within and outside the political system (John, 1998), including the processes of emulation, learning, coercion and competition described in Section 1. In the following, we draw from these theories for outlining our hypotheses regarding domestic and external determinants of policy adoption.

3.1 Domestic determinants of RE policy adoption in developing countries

Environmental factors

Environmental and resource pressures are traditionally considered to be the trigger of policy-making in the environmental field: as populations grow, industrialization advances, and consumption increases, more pressures on the environment and natural resources are generated. The severity of these problems is expected to influence environmental policy-making (Huang et al., 2007; Ringquist, 1994; Sapat, 2004; Vachon and Menz, 2006). In the energy field, increased energy demand and volatile or rising fossil fuel prices may make governments more willing to promote RE due to energy security concerns, especially if they rely on fuel or electricity imports (Bird et al., 2005; Marques et al., 2010). Furthermore, concerns about energy-related environmental impacts such as local air pollution may motivate governments to support low-emission technologies such as RE. We focus on air pollution because it is often mentioned in the literature about environmental impacts of energy production in developing countries (Chan and Yao, 2008; Mohamed and Lee, 2006; Winkler, 2005), and due to evidence that air pollution has actually led to protests and demands by the public in developing countries, which has put pressure on governments to address the problem (Economy, 2007; van Rooij, 2010). We acknowledge, however, that there may be other equally important environmental impacts of electricity production that we are not considering in the analysis. We hence expect that ***energy-related environmental problems (domestic energy insecurity and air pollution) may positively influence the adoption of policies that support RE deployment***.

Another environmental factor is the natural endowment with RE resources, such as solar irradiation, waterfalls or strong winds, which need to be present in sufficient quantity and quality to make RE investments competitive (Bird et al., 2005). We expect that ***governments are more likely to support RE technologies if their countries have sufficient natural resources to make them work in the first place***.

Socio-economic factors

Wealth has frequently been regarded as leading to stronger environmental policies, as policy adoption and implementation cost money (Ringquist, 1994; Vachon and Menz, 2006). This should be especially true in a highly technical and investment-intensive field such as renewable power generation. Furthermore, higher levels of income are usually accompanied with stronger environmental preferences of the population

(Elliott et al., 1997; Vachon and Menz, 2006). However, while empirical studies have sometimes found significant positive effects of wealth on environmental regulation (Fredriksson et al., 2005; Ringquist, 1994; Sapat, 2004; Vachon and Menz, 2006; Zarnikau, 2003), some have also found insignificant effects (Arkesteijn and Oerlemans, 2005; Lester et al., 1983; Ringquist, 1994), or even marginally significant negative effects (Ek, 2005). In addition, as explained above, there is little empirical evidence about policy adoption in developing countries in particular, but we expect that the role of income should be even stronger there due to its relative scarcity and the resulting stronger competition for financial resources with other policy goals. An early study by Dasgupta et al. (2001) found strong support for the hypothesis that developing countries with higher income per capita tend to have better environmental policies and performance. Hence, we expect a clear positive relationship especially in the case of policies that provide subsidies for RE, because they will require a government with sufficient resources to finance them, and because higher income may both lead to stronger environmental preferences and higher electricity demand. Thus, we expect that ***higher levels of income (as a proxy for wealth) are associated with a greater adoption of policies that financially support RE deployment***.

Similarly, a higher level of education makes the population more aware of environmental issues and the potential damages arising from them (Elliott et al., 1997), and leads to a more favourable assessment of the costs and benefits of environmental protection and related policy options. This results in increased support for environmental policies (Vachon and Menz, 2006; Zarnikau, 2003). Furthermore, a high level of education among the population may indicate a better capability by the administration to design new policies. Consequently, we expect that a ***higher level of education is positively correlated with the adoption of policies to promote RE***.

Institutional factors

Institutional theories posit that the characteristics of the political system influence policy adoption. There is an extensive literature on the role of democracy for environmental protection. Congleton (1992) theorizes that authoritarian regimes will adopt less stringent environmental standards than democratic ones, as democratic regimes follow the preferences of the median voter, who benefits more from the public provision of environmental quality than the authoritarian ruler, see also Fredriksson (1997) and Deacon (2000). While some literature has questioned this democracy-environment link (e.g. Midlarsky, 1998), newer studies such as those by Fredriksson and Gaston (2000), Neumayer (2002), and Li and Reuveny (2006), show that democracies tend to show stronger environmental commitment than non-democracies. We hence hypothesize that ***the more democratic the government, the more likely it is to adopt policies that support RE deployment***.

The institutional literature has also analyzed the effect of fractionalized political systems and of the number of veto players on policy adoption (Tsebelis, 1995, 1999), arguing that the more decision-making instances are involved in agreeing a new policy, the less able is a government to adopt the policy. These theories have also been applied to the study of environmental policy adoption, for example by Knill et al. (2010) and Ashworth et al. (2006). In accordance, we posit that ***the more veto players within the political process, the less likely the government is to adopt policies that support RE***. One potential limitation in our analysis is that we are not able to account for the possibility that different types of policies – new laws, regulations or statutes, for example – may be subject to different sets of veto players. This may make it more difficult to find a clear effect of veto players on RE policy adoption.

Interest groups and preferences

The strength of environmental groups has been positively linked with more or stronger environmental policy, including policies that support the deployment of RE energy (Fredriksson et al., 2005; Vachon and Menz, 2006). Thus, we expect that ***countries with high presence of environmental (and civil society) groups are more likely to adopt RE support policies***.

Ecological preferences of decision-makers and the public have been shown to be positively correlated with environmental policy-making (Knill et al., 2010; List and Sturm, 2006; Vachon and Menz, 2006). The rationale behind this is that a government of a population that generally cares about the environment can be expected to promote environmental policies. We hence expect that ***in countries with stronger preferences for high environmental quality, the government is more likely to adopt RE support policies***.

3.2 External determinants of policy adoption in developing countries

The policy diffusion literature draws from theories of organizational decision-making to assert that policy-makers look for ways to simplify their decision-making processes because capacity constraints prevent them from consulting all possible sources of information to find the best policy alternative. As a result, they look for solutions in other states or countries, where other policy-makers have solved similar problems successfully (Walker, 1969). Such *learning* – change in beliefs due to new evidence – or *emulation* – imitation due to socially constructed policy norms (Simmons et al., 2006) – is more likely to take place in case of neighbouring countries, or countries within the same region (MacGarvie, 2005), because such peers are more likely to meet in common fora and exchange information with each other (Berry and Berry, 2007). In addition, countries with cultural, historic or economic commonalities are also more likely to learn from each other (Simmons and Elkins, 2004) or even to compete for markets, e.g. for RE technology. Adoption of policies from culturally or historically similar countries can be understood as *learning* or *emulation* of peers "with psychological proximity", an idea based on constructivist theories, while adoption of policies from countries with similar economic structures may be a sign of *competition* (Simmons et al., 2006). Hence, we expect that the ***adoption of a specific RE support policy is more likely in a country if neighbours or countries with a common language, the same colonial history, or within the same economic and regional bloc, have already adopted it***.

Apart from the three horizontal diffusion mechanisms of *competition*, *learning* and *emulation* there is also a vertical diffusion mechanism: *coercion* by more powerful actors (Dobbin et al., 2007; Shipan and Volden, 2008; Simmons et al., 2006). Different types of coercion are physical force, the monopolization of information or expertise and the manipulation of economic costs and benefits (Dobbin et al., 2007). The last type, manipulation of economic costs and benefits, does not need to be coercive, so we may add financial *incentives* as additional diffusion mechanism. Both coercion and incentive mechanisms of diffusion have been found in research on state-level policy adoption in the US (Daley and Garand, 2005). At the international level, such top-down diffusion originating from a central government is missing but hegemonic countries (e.g. the US) may have coercive power (Dobbin et al., 2007). In the context of developing countries, the influence of former colonizers may be particularly relevant, as strong economic and political ties have remained after independence (Albaugh, 2009; Neumayer, 2003; Neumayer and Perkins, 2005). Therefore, we stipulate that the ***adoption of RE policies is more likely the more former colonizers have already adopted them.***

Vertical *coercion* or *incentives* may not only emerge from powerful countries but also from international organizations. Studies have found that international agreements (Tews et al., 2003) and international organizations (Edwards, 1997) may influence the adoption of national policies. As the international climate regime does not provide direct obligations for developing countries, and emission targets of transition countries under the Kyoto Protocol are not strict enough to require government actions, we do not expect a direct signal from the signature of the UN Framework Convention or Kyoto Protocol. However, developing countries may have reacted to more specific components of international climate policy that are targeted towards them. We hypothesize that developing country governments may have reacted to the financial opportunity provided by the Clean Development Mechanism (CDM), see von Stein (2008), and to RE-related capacity building under development and environmental finance initiatives (Heggelund et al., 2005). While reacting to the CDM would imply a form of incentive-based policy diffusion mechanism such as the one observed by Welch and Thompson (1980) or Daley and Garand (2005), the effects of capacity building would rather resemble learning. We thus postulate that ***developing countries with interest in participating in the CDM, or with RE-related projects under international environmental or development funding are more likely to adopt policies that support RE.*** In the case of European economies in transition, the European Union (EU) may both enable learning or use coercive power, e.g. by imposing RE targets on all member states (REN21, 2007). Therefore, we assume that ***the accession to the EU has a positive influence on the adoption of RE policies.***

4. Empirical strategy and method

In the most recent literature, the internal and external determinants of policy innovation are usually estimated by event history analysis, which can be used to model the probability that an event (in our case policy adoption) will take place given a set of covariates, see also Biesenbender and Tosun (2014). In the type of event history analysis applied here, we use area-period data (in our case country-year) and set the dependent variable (policy adoption) to 0 in all periods before adoption, to 1 in the period in which the policy is adopted, while excluding all countries from the dataset after the policy is adopted, as we are not interested in the presence but in the adoption of policies (Berry and Berry, 2007). We estimate the probability of policy adoption with a logit model, one of the standard models used for estimating discrete-time event history models, using maximum likelihood techniques. Discrete-time models are suitable for this application, as our data on policy adoption is summarized in discrete time periods (years). We include time dummies to allow the data to determine the baseline hazard function in a non-parametric way rather than pre-determining it as would be the case when using a linear or any other function (Tekle and Vermunt, 2010).

5. Data and operationalization

5.1 Dependent variables

As dependent variables we use dummies indicating the adoption year of each of the four RE support policies analysed. The timespan considered starts in 1998, as data on earlier adoption is not reliable, and ends in 2009, and covers 162 emerging and developing countries (see Supplementary Material, Table S1 for a list of the countries included in the analysis). The variables were coded, as usual in event history analysis, with the value of one in the adoption year, zero before adoption, and missing after adoption, and were collected from different databases (EBRD, 2011; IEA, 2011a; REEEP, 2011; REN21, 2011). If both the year of legislative decision and of entry into force were reported (e.g. IEA, 2011a), we used the year of entry into force to allow for comparability because the most complete information source (REN21, 2011) just reported whether a policy is in place or not. If two sources reported different adoption years, we used the data from the sources with more contextual information on the adoption process (IEA, 2011a; REEEP, 2011). We only included policies adopted at the national level to make units comparable. To account for the fact that subnational RE policies may also play a relevant role in the 23% of countries in the dataset that have a federal system, we run a sensitivity analysis with a dummy for whether a country has a unitary (and not a federal) system as control variable, using data from Norris (2009), as contained in QOG (2012).

5.2 Domestic determinants of policy adoption

Environmental factors

Domestic energy security: we proxy domestic energy security with a variable reflecting the generic energy independence (% of domestic energy that is produced in-country). All data is sourced from EIA (2010). As additional measure for energy security, we would preferably also control for the average oil price in the relevant year, using data for the Brent - Europe crude oil price from EIA (2011). However, as energy prices only vary over time but not between countries, we can only test the influence of oil prices if we exclude the time fixed effects. Therefore, we will use models with oil prices only in the sensitivity analysis (see Supplementary Material, Table S8).

Air pollution: among all major air pollutants (SO_X, NO_X, PM_{10}, VOC, and NH_3), SO_X is the only one for which the power sector is the most important source: roughly 70% of SO_X emissions in Europe (EEA, 2012) and of SO_2 emissions in the US (EPA, 2012) originate from electricity production. In South and East Asia, the share was similar in 2000 (EDGAR, 2012). We, therefore, measure electricity-related air pollution with metric tonnes of SO_2 per square metre of populated land area, using cross-sectional data of the year 2000 from EDGAR as reported in the Quality of Government dataset (QOG, 2012).

Natural resources: we proxy hydropower resources with the logarithm of average rainfall in the relevant period (DWD/WZN, 2010) times average elevation of the country (Gallup et al., 2001), wind and solar resources with % of time when the wind speed is above 6m/s and latitude tilt radiation in $kWh/m^2/day$ in the years 1983-2005 (NASA, 2011), geothermal resources with the number of volcanoes as indicator for geothermal activity (Smithsonian Institution, 2011) and biomass resources with the agricultural area in km^2 (FAO, 2012). The original hydro, solar and wind data is pixel-based with a precision of 1 degree (geographical coordinates). We allocated this data to countries by assigning each pixel to a specific country (using Google maps coordinates) and averaging the hydro, solar and wind data in the pixels allocated to the respective country.

Socio-economic factors

Level of income: the Gross Domestic Product (GDP) per capita is the usual way to measure the relative level of income. We use power purchasing parity figures for GDP to reflect the in-country value of income, obtaining data from the World Bank (2011). The GDP level was standardized to 2007 US dollars using deflators from the OECD (2010) and the logarithm was taken to improve the distribution of the variable.

Level of education and human resources: the percentage of gross secondary school enrolment was taken as proxy for the level of education (World Bank, 2011), as data on tertiary education is only available for a limited amount of countries and years. For few country-year points, data was missing and we used linear interpolation to fill the gaps.

Population: to control for overall size of a country, we included the logarithm of the population as further determinant, using data from the World Bank (2011).

Institutional factors

Democracy: all available indices for democracy over time have substantial drawbacks in conceptualization, measurement, and aggregation (Munck and Verkuilen, 2002), and only two (Polity and Freedom House Index) cover more than 150 countries and the time period 1995-2010. Of these two indicators with wide coverage, the Polity IV variable (Marshall et al., 2010) has better intercoder reliability, clearer and detailed coding rules (Munck and Verkuilen, 2002) and is, therefore, taken as our indicator for democracy. We do, however, try other indicators of democracy, such as Freedom House and the Bertelsmann Index contained in QOG (2012). Polity IV classifies countries from -10 (institutionalized autocracy) to 10 (institutionalized democracy).

Veto players: the number of veto players is taken from the Database of Political Institutions 2009 (updated March 2010), as contained in the Quality of Government database (QOG, 2012). The variable was first coded by Keefer and Stasavage (2003), is at minimum one, and further increases the more veto players are involved in legislative decision-making.

Interest groups and preferences

Civil society and environmental groups: The strength of civil society is measured with the number of development civil society organizations in the year 2000 (Grimes, 2008). Environmental pressure groups are measured with the presence of Greenpeace members in a country (data from von Stein, 2008) and the number of environmental Non-Governmental Organizations as listed in Europa Publications (2000) and Hartley et al. (2009); data in between the years reported in these publications was linearly interpolated. For all variables except the Greenpeace dummy we used the natural logarithm.

Environmental preferences: As we do not have a direct measure of ecological preferences for all countries included in our sample, we use presence of a Green Party (Global Greens, 2012) as proxy for environmental voting behaviour, and the terrestrial protected areas in % of total land area in the year 2008 (World Bank, 2011) and air pollution, measured by the level of sulphur dioxide emissions (see above), as proxies for environmental preferences.

5.3 International determinants (horizontal and vertical)

Influence from horizontal diffusion mechanisms (learning, emulation and competition): To proxy diffusion mechanisms originating from learning from, emulating, and competing with geographical, cultural and economic peers, we generate four variables (*neighbours, common colony, common language and tradebloc*) that entail the percentage of similar countries that had already adopted the relevant policy in the previous time period. To construct the neighbour, common colony, and language variables, we use dyadic data from CEPII (2011) on land borders, common colonizers and on countries with a common language spoken by at least 9% of the population. For the regional trade blocs, we use memberships in regional and trade organizations as contained in the 2.3 version of the COW-2 International Organizations Dataset, originally coded by Pevehouse et al. (2004). While primarily taking the 2005 membership data (as proxy for the period 2000-2010), we complemented UNASUR as regional organization and included all countries listed on UNASUR (2012) as members. Each country was assigned to only one organization, e.g. all North African states to the Arab League but not to the African Union. A list of the regional and trade organizations coded is provided in the Supplementary Material, Table S1.

Influence from vertical diffusion mechanisms (coercion, incentives and learning): For measuring the influence of the former *colonizers*, we construct a variable containing the percentage of former colonizers (in the past 200 years) that have adopted the policy in the previous time period, using dyadic data from CEPII (2011). If countries have not existed in colonial times, the colonizer of the respective geographical area was taken. For the Clean Development Mechanism we measured in how many of the past three years (t-1, t-2, t-3) the country has been host of at least one registered CDM project involving RE. We can rule out potential endogeneity, given that CDM projects are already planned at least 1-2 years before registration so it is very unlikely that their planning is influenced by policies adopted 2-5 years later. International environmental funding relevant for RE mainly stems from the Global Environmental Facility (GEF), the operational entity of the UNFCCC financial mechanism since the early 1990s. We use data from GEF (2011) on RE funding approved in the previous 3 periods, as coded by Stadelmann (2009). For international development funding, we use a dummy on whether official development assistance entailing support for RE was committed for the relevant country in the previous 3 periods. The data for development assistance promoting RE was taken from Michaelowa and Michaelowa (2011). For measuring the effect of EU membership, a dummy variable was created taking on the value of 1 if the country was member of the EU in 2005. In addition, we control for membership to the *CEFTA* (Central European Free Trade Agreement), since these countries' policy choices may be influenced by their expectation to become EU member states soon. EU and CEFTA membership are coded for the year 2005 to keep consistency with the coding of other regional and trade blocs.

Table S2 in the Supplementary Material provides an overview of all variables, their summary statistics and their expected influence. A correlation table can be found in Table S3. Given that we control for many covariates, we only have full data for 106 of the 163 countries in our dataset; the other countries are excluded from the analysis (see Table S1 for the list of 106 countries included). This non-random sample selection questions the validity of the results beyond the included countries. While included countries do not differ significantly from excluded countries in terms of RE policy adoption probability, they tend to be clearly larger, have more civil society groups, more neighbours and trade bloc peers that adopt RE policies and they receive more international financial support for RE deployment (see Supplementary Material Table S9).

6. Results

For each of the four types of policies in our dependent variables, we have estimated full models including all variables described above and parsimonious models only including variables that had a significant or almost significant impact in at least one of the full models. Likelihood ratio tests, the Akaike Information Criterion and the Bayesian Information Criterion suggest that the parsimonious models are preferable (see Supplementary Material, Tables S4a and S4b). Therefore, we will in the following discuss the results of the parsimonious models (Table 2), while referring to the full models only if needed. In all models and for all independent variables, we report the marginal effects, which makes it easier to understand the actual magnitude of the effect on RE policy adoption (% changes). We report the marginal effects at the average value of all variables in the model, in order to show the estimated effects for an average country in the dataset. As this represents the effects for a country that cannot really exist, as membership in the EU or CEFTA is either given or not, we have also calculated the marginal effects setting the EU and CEFTA dummy variables to zero but results are similar (see Table S5).

In general both domestic and international determinants are important for policy adoption but we find slightly more evidence for the relevance of domestic compared to international drivers, as shown by the model evaluation criteria (AIC, BIC) estimated for regression models including either only international or only domestic determinants (see Table S6 in the Supplementary Material). These results are consistent with other recent studies of RE policy diffusion across US states, in which the states' internal determinants are found to be more important than diffusion variables in explaining policy adoption (Lyon and Yin, 2010; Matisoff and Edwards, forthcoming; Matisoff, 2008). They challenge however earlier findings from the sociological literature on World Society Theory, which argue that external forces (international diffusion variables) provide a stronger explanation for policy adoption in the environmental domain than domestic ones (see e.g. Frank et al., 2000).

6.1 Domestic determinants

Environmental factors

We hypothesized that energy insecurity and bad air quality would have a positive effect on RE policy adoption. In terms of energy insecurity, our estimates show that the share of domestically-produced energy decreases the probability of FIT adoption and financial incentives, which is in line with our expectations.

Our indicator for air quality (SO_2) never displayed significant coefficients, which may be due to the fact that two opposing effects may be at play: while bad air quality may encourage governments to adopt policies that help to reduce air pollution, good air quality may be an indicator of an environmentally-friendly government that is more inclined to support RE policy. Further research is thus needed to clarify whether air quality does have an impact on RE policy adoption.

In terms of natural resources, our models estimate a significant positive relationship between wind resources and target adoption, solar resources and financial incentives, and biomass and hydro resources and tariff adoption (all in line with the expected effects), but they do not estimate similar effects for all the other combinations analysed. In addition, the models find a negative relationship between hydrological resources and the adoption of RE targets, which is against our theoretical expectations. This may be related to the fact that most countries with large hydro power resources already had a substantial share of RE historically, so they may feel less inclined to adopt new RE targets.

Socio-economic factors

GDP per capita has an estimated significant effect on the adoption of FITs and other financial incentives but not for other policies as expected. We also expected to find a positive effect of education on RE policy adoption, but the positive coefficient is not significant in any of our full models so we excluded it from the parsimonious ones. As our education variable is highly correlated with GDP per capita (see Supplementary Material, Table S3), such a weak effect is not surprising. In contrast, all models estimate that population as measure for the overall size of the country is positively related with policy adoption.

Institutional factors

Our indicator for democracy is a significant predictor for adoption of financial incentives, while the coefficient is also positive but not significant in the other models (the influence of democracy on frameworks becomes significant at the 10% level if we include the unitary state dummy). When replacing our indicator Polity IV with other democracy indicators - Freedom House and Bertelsmann Democracy Status -, the model obtains similar results and we can, therefore, be quite confident that, in the case of RE financial incentives, our findings support Congleton's (1992) theory that democracies are more likely to adopt environmental protection policies.

Veto players have no significant impact according to model estimates, although the expected negative coefficient is just not significant at the 10% level in case of financial incentives. A negative impact on financial incentives seems generally most reasonable among the analysed policies as financial incentives involve more financial resources than targets and framework policies (and also require parliamentary approval in most cases), so opposition from major political players is more likely, while in the case of FITs, important veto players may be in favour (for the case of Germany, see Jacobs, forthcoming; Jacobsson and Lauber, 2006). As discussed above, the quality of our data does not allow us to account for the type of policy instrument used (in terms of it being a fully-fledged law, or just a regulation to an existing law or an even lower-level instrument), which may limit the comparability of veto players' effects across our cases, and thus reduce the statistical significance of our findings.

In one of our sensitivity analyses (see Table S8), the model estimates, as expected, that unitary states are more likely to adopt targets, tariffs and incentives than federal ones, but this effect is not significant and does not affect other results other than rendering the EU dummy insignificant, which is due to the positive correlation of EU membership and unitary systems in the dataset. Federal states are estimated to be more likely to adopt policy frameworks, which may be related to the fact that in federal systems, national policy frameworks serve as basis for sub-national policies.

Interest groups and preferences

Almost all variables related to the potential role of interest groups (civil society organizations, environmental NGOs) and environmental preferences (natural protected areas, green party existence) appear not to have a significant relationship with RE policy adoption. One limitation of this finding is that our indicators for interest groups and environmental preferences are sub-optimal; membership in all environmental NGOs and environmental voting behaviour of parliaments would be preferable indicators but data is not available. Therefore, we cannot rule out that interest groups and governmental preferences are influential; we can just conclude that the indicators we used have no significant effect according to our models. As the coefficients were consistently not significant, these variables are not included in the parsimonious specifications in Table 2 (for coefficients, see the Supplementary Material, Table S8).

6.2 International determinants

When turning to the international diffusion mechanisms, our estimations did not find a significant impact of policy adoption by trade bloc partners, colonizing countries and countries with the same language on adoption of RE policies in the full models, and these variables are, therefore, excluded from the parsimonious models. Adoption by neighbours is related to an increase in the adoption of framework policies but the coefficient is not significant at the 10% level, unless we include the unitary state dummy. In contrast, adoption by countries that had belonged to the same colony has a significant impact on adoption of FITs, incentives and framework policies, which supports our expectations. Having the same colonial past may imply a similar regulatory culture that promotes policy diffusion, in the same way as the Walker regions' regulatory culture, see Matisoff and Edwards (forthcoming). All these results hold both when including all diffusion variables in the same regression model, and when including them individually (see Table S7 in the Supplementary Material). Membership to the EU is estimated to be influential for adoption of targets, tariffs and financial incentives. This underlines the institutional role of the EU as early mover in policies to promote RE and reduce greenhouse gases, and is in line with the policy convergence theories (Holzinger et al., 2008) and also with the findings of Biesenbender and Tosun (2014). We have, however, to be cautious about the EU effect, as the coefficient is not significant at the 90% level anymore if including the unitary state dummy.

Funding from the Global Environment Facility is estimated to have a positive influence on adoption of framework policies, while the impact was not significant for other policies. However, we have to be cautious about concluding that GEF has been successful in its capacity building efforts, as the GEF coefficient is quite sensitive to the model specification (see the Supplementary Material, Table S4a/b). We do not find a significant relationship between official development funding (ODA) and policy adoption – only in the case of FITs the model estimates an effect that is almost significant at the 10% level.

The registration of CDM projects was irrelevant for all policies in the standard model, although the influence on target adoption and framework policies was significant at the 10% level if other lags for the CDM were used (see Supplementary Material, Table S8) or the unitary state dummy was included. The potential influence on target setting and framework policies may relate to the positive signal of CDM project registration on the feasibility of more ambitious RE targets, while the clearly non-significant influence on financial incentives and tariffs may relate to the fear of developing countries that, after adoption of new incentive policies, their RE projects are not considered as "additional" to the business-as-usual scenario any more, which would make them ineligible for CDM funding (Winkler, 2004).

(Table 2 about here)

7. Conclusions

This article is a first attempt to understand climate policy innovation in the South, a process that has been largely neglected by the policy innovation literature, but which is crucial for global climate change governance. Developing countries have a key role to play in the planned low-carbon transformation, but in the absence of internationally-binding regulations on their carbon emissions, achieving such a role requires domestic-level incentives and policies. Concretely, we shed light on the theoretically expected determinants of the adoption of RE support policies in developing countries, considering both domestic factors and international diffusion mechanisms and four different types of RE policies.

Among the domestic factors investigated, environmental factors and interest groups are only partly found to be relevant for RE policy adoption according to our models. Our models suggest that domestic energy production, as a proxy for energy security, decreases the probability of promoting RE through FITs and financial incentives, while the level of environmental quality does not have a significant influence. Our indicators of interest groups – Greenpeace memberships, number of environmental NGOs, and other civil society groups – are estimated to have no influence on RE policy adoption, but given that these indicators are quite imperfect, further research on the influence of interest groups and environmental preferences is needed. Furthermore, our models find some evidence that having hydrological potential decreases the probability of adopting RE targets, which often exclude traditional hydro power, while availability of other renewable resources can increase the probability of RE policy adoption.

We have strong statistical evidence that socio-economic and institutional characteristics affect the probability of policy adoption. The level of income is estimated to have a positive influence on the adoption of costly policies, such as financial incentives and feed-in tariffs. Our models suggest that countries with a larger population have a higher probability of adopting policies that support the deployment of RE, while a more democratic system promotes at least the adoption of financial incentives.

In terms of international policy diffusion, we have found little evidence for horizontal diffusion mechanisms. Our models estimate that only adoption by peers that had the same colonial history increases the likelihood of policy adoption, while adoption of a policy by neighbours, trade partners and countries with the same language has no influence. These results match with recent findings from the US (Matisoff and Edwards, forthcoming), where adoption by neighbour states had no impact on RE policy adoption, while states with similar regulatory histories ("Walker regions") influence each other. Such diffusion among peers with similar colonial history may be related to established institutions or fora that enable exchange, such as the Commonwealth (Leichter, 1983; Stone, 2000), or similar administrative and political systems (Weber et al., 2009; Weiner, 1987) that may simplify emulation and learning.

Vertical channels of policy diffusion are also estimated to be relevant. In particular, membership of the EU seems to increase the adoption of RE policies, although the effect is not significant when controlling for federalism of the system. Our models also find some evidence that funding from the GEF has positive effects on the adoption of framework policies but not of more specific support policies, which is in line with the primary role of the GEF as capacity building organization promoting learning, and its lack of funding for substantial incentives. Having RE projects supported by the CDM is estimated to increase the adoption of RE targets and policy frameworks according to some model specifications, while it does not affect the probability of adopting financial incentives and FITs. This is an important finding, given that the CDM has also been discussed as *disincentive* for RE policy adoption (He and Morse, 2010; Winkler, 2004).

The study has some limitations that show potential further areas of research. First, the distinction between domestic and international determinants is rather simplistic. In reality, domestic and international determinants may interact, e.g. the share of domestic energy is also dependent on the price and availability of international energy sources and the impact of international climate funding will depend on national institutions. Therefore, more qualitative work on the interplay between domestic and international actors and institutions may provide further insights. Within the emerging economies, case studies could look at countries such as China or India, which face significant pressure from the international community to act domestically to tackle climate change, but which also have a strong domestic interest in diversifying their (currently very coal-intensive) energy matrix. In poorer developing countries, case study selection could rather be based on similarity of domestic institutions and strength of ties with industrialized countries (e.g. former colonizers). Such qualitative studies may also explore whether the effects of the EU and of international climate finance rather relate to learning and emulation or to coercion and incentives. Finally, they could also shed a clearer light on the different findings between the political science and the sociological literature about the relative importance of domestic and international determinants in fostering policy adoption.

Second, Walker's (1969) definition of first-time adoption of a policy within a country neglects the multi-step policy process, so further research may analyse the processes of adapting policies to the national context and of tightening or relaxing policies after first-time adoption. This is critical, as there is evidence that changes in pricing policies or tax incentives can stop investments, as experienced in Tamil Nadu with wind power tariffs in 2001 and in Sri Lanka with small hydro power in 1999 (Jagadeesh, 2000; Martinot et al., 2002). A first quantitative study in this direction, albeit in a different policy area, is presented by Biesenbender and Tosun (2014). Furthermore, it may be fruitful to use event history models also for the study of other climate policies in developing countries, such as climate change adaptation strategies and generic policies pledged under recent climate agreements.

Third, our separate analysis of different policies may hide the fact that policies are not adopted independently from each other – the adoption of one policy may make the adoption of another policy less likely (in case of competing instruments) or more likely (in case of complementary instruments). We actually tested whether the presence of framework policies increases the likelihood of tariff and incentive adoption, but did not find any significant result. Multinomial models would have to be used to find out whether policies are competing with each other.

For policymakers, the results suggest that plans to set up renewable energy policies in developing countries should consider that different factors may influence RE policy adoption in the North and in the South. In particular, our models estimate that beyond domestic-level determinants such as income levels and democracy, which have been already studied in the existing literature, and beyond the well-known Europeanization effect, RE policy adoption in the South also seems to be influenced by the countries' colonial past and to a certain extent by financial support received through international institutions. Our evidence shows however that so far, international financial transfers – through the GEF and the carbon market – have only been supportive of the adoption of "soft" policies such as RE targets and policy frameworks that may arguably not be as effective in promoting the energy transformation as pricing policies or other financial instruments. Policymakers hence could consider how to improve or complement the existing international support mechanisms so that more powerful domestic policies can also be supported.

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Table 1: Adoption of RE policies in developing and emerging countries

Type of policy	Number of countries (excluding European economies in transition)[a]		
	1999	**2004**	**2009**
General strategy			
RE targets	3(1)	18(11)	56(43)
Framework policies (strategies, plans, generic laws)	19(14)	55(41)	96(78)
Regulatory policies			
Renewable portfolio standards / utility quotas	0	3(1)	9(6)
Feed-in tariff and energy production payments	4(2)	15(9)	40(26)
Improved access to the electricity grid	4(2)	17(11)	26(16)
Other regulatory measures	3(2)	8(6)	13(10)
Financial incentives	7(4)	21(14)	42(30)
Public financing			
Public investment	2(2)	3(2)	17(13)
Competitive bidding / tenders	0	1(1)	8(6)
Research & development	5(4)	8(6)	13(10)
Total Countries with RE policies/strategies	**31(22)**	**72(54)**	**112(92)**

a: Source: Data on policy type and year of adoption from IEA (2011b), REEEP (2011) and REN21 (2011), see section 5.1 for details. Numbers in parentheses exclude European economies in transition, which are by some not considered to belong to developing and emerging countries.

Table 2: Logit estimations of the probability of policy adoption (parsimonious models)

	Targets		Feed-in-tariffs		Financial incentives		Framework policies	
	dy/dx[a]	SE[b]	dy/dx	SE	dy/dx	SE	dy/dx	SE
Domestic determinants								
Domestic energy[c]	-0.001	(0.001)	-0.004 **[d]	(0.001)	-0.002	(0.001)	-0.003	(0.004)
GDP per capita	0.001	(0.002)	0.008 **	(0.002)	0.009 **	(0.003)	0.010	(0.008)
Population[c]	0.007 ***	(0.002)	0.005 **	(0.002)	0.007 ***	(0.003)	0.017 ***	(0.005)
Hydro resources	-0.004 **	(0.002)	0.005 **	(0.002)	0.002	(0.002)	-0.006	(0.005)
Wind resources	0.000 **	(0.000)	-0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
Solar resources	0.001	(0.003)	0.000	(0.004)	0.006 *	(0.003)	-0.008	(0.011)
Geothermal res.	-0.000	(0.000)	0.000	(0.000)	0.000	(0.000)	-0.000	(0.001)
Biomass resources	-1.768	(1.178)	0.566 *	(0.321)	-0.662	(1.029)	-1.899	(2.158)
Democracy	0.000	(0.000)	0.001	(0.001)	0.001 *	(0.000)	0.002	(0.001)
Veto players	0.001	(0.001)	-0.001	(0.002)	-0.002	(0.001)	-0.001	(0.004)
International determinants								
EU member	0.021 **	(0.010)	0.030 **	(0.013)	0.027 **	(0.012)	-0.014	(0.032)
CEFTA	0.013	(0.009)	0.016	(0.010)	0.018 *	(0.010)	0.045	(0.030)
Neighbours	0.010	(0.007)	-0.012	(0.010)	0.008	(0.008)	0.034	(0.024)
Common colony	-0.004	(0.016)	0.066 **	(0.026)	0.080 **	(0.037)	0.068 *	(0.040)
CDM projects	0.005	(0.003)	-0.002	(0.004)	0.002	(0.003)	0.023	(0.017)
GEF funding	0.005	(0.004)	0.006	(0.005)	0.004	(0.004)	0.031 *	(0.018)
Development aid	-0.004	(0.004)	0.006	(0.005)	0.004	(0.005)	0.003	(0.015)
Year dummies	Yes		Yes		Yes		Yes	
N	1122		938		941		864	
Years	12		10		10		12	
log likelihood	-137.7		-109.6		-110.1		-185.7	
BIC	479.0		404.0		405.0		567.4	

a: dy/dx: Marginal effects at mean values of all other independent variables

b: SE: standard error

c: For these variables the 2009 values have been extrapolated

d: Significance levels: * = p-value <0.1, ** = p-value <0.05, *** = p-value <0.01

Supplementary Material to "Climate policy innovation in the South - domestic and international determinants of renewable energy policies in developing and emerging countries"

Contents

Details of dataset

Additional statistical results and robustness checks

Table S1: Coding of regional / trade blocs by country (used for tradebloc variable)

Tradebloc	Country
ASEAN	Brunei Darussalam
ASEAN	Cambodia*
ASEAN	Indonesia*
ASEAN	Lao PDR*
ASEAN	Malaysia*
ASEAN	Myanmar
ASEAN	Philippines*
ASEAN	Singapore
ASEAN	Sri Lanka*
ASEAN	Thailand*
ASEAN	Vietnam*
AU	Angola*
AU	Benin*
AU	Botswana*
AU	Burkina Faso*
AU	Burundi*
AU	Cameroon*
AU	Cape Verde
AU	Central African Rep.*
AU	Chad
AU	Congo*
AU	Côte d'Ivoire
AU	Dem. Rep.of Congo
AU	Equatorial Guinea*
AU	Eritrea
AU	Ethiopia*
AU	Gabon*
AU	Gambia
AU	Ghana*
AU	Guinea*
AU	Guinea-Bissau
AU	Kenya*
AU	Lesotho
AU	Liberia
AU	Madagascar*
AU	Malawi*
AU	Mali*
AU	Mauritius
AU	Mozambique*
AU	Namibia*
AU	Niger*
AU	Nigeria*
AU	Rwanda*
AU	Sao Tome & Principe
AU	Senegal*
AU	Seychelles
AU	Sierra Leone
AU	South Africa*
AU	Swaziland*
AU	Tanzania*
AU	Togo*
AU	Uganda*
AU	Zambia*
AU	Zimbabwe
CARICOM	Bahamas
CARICOM	Barbados
CARICOM	Belize
CARICOM	Dominica
CARICOM	Grenada
CARICOM	Guyana*
CARICOM	Haiti
CARICOM	Jamaica*
CARICOM	St. Kitts-Nevis
CARICOM	St. Lucia
CARICOM	St.Vincent & Gren.
CARICOM	Suriname
CARICOM	Trinidad and Tobago*
CEFTA	Albania*
CEFTA	Bosnia-Herzegovina
CEFTA	Bulgaria*
CEFTA	Croatia
CEFTA	Macedonia*
CEFTA	Romania*
CIS	Armenia*
CIS	Azerbaijan*
CIS	Belarus*
CIS	Georgia
CIS	Kazakhstan*
CIS	Kyrgyzstan
CIS	Moldova*
CIS	Russia*
CIS	Tajikistan*
CIS	Turkmenistan
CIS	Ukraine*
CIS	Uzbekistan*
ChiKorMon	China*
ChiKorMon	Korea, Republic of*
ChiKorMon	Mongolia*
ChiKorMon	Taiwan
EU	Cyprus
EU	Czech Republic*
EU	Estonia*
EU	Hungary*
EU	Latvia*
EU	Lithuania*
EU	Poland*
EU	Slovak Republic*
EU	Slovenia*
LOAS	Algeria
LOAS	Bahrain*
LOAS	Comoros*
LOAS	Djibouti
LOAS	Egypt*
LOAS	Iraq*
LOAS	Jordan*
LOAS	Kuwait*
LOAS	Lebanon
LOAS	Libya*
LOAS	Mauritania*
LOAS	Morocco*
LOAS	Oman*
LOAS	Qatar
LOAS	Saudi Arabia*
LOAS	Somalia
LOAS	Sudan*
LOAS	Syria*
LOAS	Tunisia*
LOAS	United Arab Emirates*
LOAS	Yemen*
NAFTA	Mexico*
SAARC	Bangladesh*
SAARC	Bhutan*
SAARC	India*
SAARC	Maldives
SAARC	Nepal*
SAARC	Pakistan*
SICA	Costa Rica*
SICA	El Salvador*
SICA	Guatemala*
SICA	Honduras
SICA	Nicaragua*
SICA	Panama*
SPC	Cook Islands
SPC	Fiji*
SPC	Kiribati
SPC	Marshall Islands
SPC	Micronesia, Fed. Stat.
SPC	Nauru
SPC	Niue
SPC	Palau
SPC	Papua
SPC	Samoa
SPC	Solomon Islands
SPC	Timor-Leste
SPC	Tonga
SPC	Tuvalu
SPC	Vanuatu
UNASUR	Argentina*
UNASUR	Bolivia*
UNASUR	Brazil*
UNASUR	Chile*
UNASUR	Colombia*
UNASUR	Ecuador*
UNASUR	Paraguay*
UNASUR	Peru*
UNASUR	Uruguay*
UNASUR	Venezuela*
-	Cuba
-	Dominican Republic*
-	Iran*
-	Israel*
-	Turkey*

* 106 countries included in the empirical analysis (in case of other countries, data was not available for all variables)

Table S2: Description and summary statistics of all variables

Variable	Description	Sign	Source	N	Mean	SD	Min	Max
Target adoption	Adoption of renewable energy targets in specific year (dummy)		Own coding using data from EBRD, 2011; IEA, 2011a; REEEP, 2011; REN21, 2011;	1122	0.04	0.20	0.0	1.0
Tariff adoption	Adoption of feed-in tariffs in specific year (dummy)			1020	0.03	0.16	0.0	1.0
Incentive adoption	Adoption of financial incentive for RE in specific year (dummy)			1029	0.03	0.16	0.0	1.0
Framework adoption	Adoption of framework policy for RE in specific year (dummy)			835	0.07	0.26	0.0	1.0
Domestic energy	% of energy consumption produced domestically	-	EIA (2010)	1122	-0.65	1.91	-8.5	5.0
GDP per capita	Natural logarithm of GDP per capita in 2007 USD, PPP	+	World Bank (2011)	1122	8.28	1.16	5.6	11.3
Population	Natural logarithm of population	+	World Bank (2011)	1122	16.11	1.49	13.1	21.0
Education	% gross secondary school enrolment	+	World Bank (2011).	1122	0.61	0.29	0.1	1.2
Hydro resources	Natural logarithm of average annual rainfall * average elevation	+/-	DWD/WZN (2010), Gallup et al. (2001)	1122	5.83	1.48	1.0	8.3
Wind resources	% of time wind speed is above 6 m/s, average over country area	+	NASA(2011)	1122	18.53	13.51	0.1	52.9
Solar resources	Latitude tilt radiation in kWh/m²/ day, average over country area	+	NASA(2011)	1122	4.96	0.84	2.7	6.4
Geothermal reso	Number of volcanoes in the country	+	Smithsonian Institution (2011)	1122	3.76	10.97	0.1	73.0
Biomass res.	Agricultural area in km² per capita	+	FAO (2012)	1122	0.00	0.01	0.0	0.1
Democracy	Polity IV index (10=full democracy, -10 = full autocracy)	+	Marshall et al. (2010)	1122	2.17	6.47	-10.0	10.0
Unitary state	Unitary, and not federal state	+	QOG (2012)	1122	0.77	0.42	0.0	0.1
Pollution (SO_2)	SO_2 emissions per square meters	+/-	EDGAR (2012)	1122	3.97	13.82	0.0	131.0
Civil society organizat.	Natural logarithm of development civil society organizations in 2000	+	Grimes (2008)	1122	4.29	1.43	-2.3	6.6
Veto players	# of veto players in the country	-	QOG (2012)	1122	2.60	1.56	1.0	18.0
EU member	EU membership (dummy)	+	Own coding	1122	0.05	0.21	0.0	1.0
CEFTA	Membership in CEFTA (dummy)	+	Own coding	1122	0.04	0.20	0.0	1.0
Language	% countries with same language having adopted the policy one year ago	+	Own coding using CEPII (2011)	1122	0.11	0.15	0.0	1.0
Neighbours	% neighbour countries having adopted the policy one year ago	+	Own coding using CEPII (2011)	1122	0.12	0.22	0.0	1.0
Tradebloc	% of countries within the same bloc having adopted the policy one year ago	+	Own coding using Pevehouse et al. (2004)	1122	0.08	0.12	0.0	0.9
Common colony	% of countries with same colonizer having adopted the policy a year ago	+	Own coding using CEPII (2011)	1122	0.03	0.06	0.0	0.3
Colonizer	Dummy whether former colonizer has adopted policy		Own coding using CEPII (2011)	1122	0.63	0.47	0.0	1.0
CDM projects	CDM projects for RE registered in 3 previous years	+	URC (2012)	1122	0.09	0.38	0.0	3.0
GEF funding	GEF grants for RE approved in 3 previous years (dummy)	+	Stadelmann (2009)	1122	0.11	0.31	0.0	1.0
Development aid	ODA grants for RE committed in 3 previous years (dummy)	+	Michaelowa and Michaelowa (2011)	1122	0.56	0.50	0.0	1.0
Green Party	Existence of Green Party (dummy)	+	Global Greens (2012)	1122	0.53	0.50	0.0	1.0
Protected area	Terrestrial protected areas in % of total land area in the year 2008 (100=100%)	+	World Bank (2011)	984	17.38	17.08	0.0	110.4

Table S3: Correlation table (pair-wise Spearman correlation coefficients)

	Target	Tariff	Incentive	Framew.	Dom. En.	GDP p.c.	Populat.	Educat.	Hydro	Wind	Solar	Geoth.	Biomass	Democ.	Pollution	Civil soc.	Veto play.	EU	CEFTA	Language	Neighb.	Tradebloc	Colonizer	CDM	GEF	Dev. aid	Green P.	Protected
Target adoption	1.00																											
Tariff adoption	0.12	1.00																										
Incentive adopt.	0.01	0.21	1.00																									
Framework adopt.	0.35	0.08	0.17	1.00																								
Domestic energy	-0.02	-0.01	-0.01	-0.05	1.00																							
GDP per capita	0.08	0.08	0.07	0.04	0.32	1.00																						
Population	0.13	0.03	0.11	0.11	0.08	-0.25	1.00																					
Education	0.11	0.12	0.08	0.10	0.12	0.77	-0.12	1.00																				
Hydro resources	-0.04	0.03	0.04	0.02	-0.04	-0.41	0.19	-0.32	1.00																			
Wind resources	0.02	0.00	-0.01	-0.02	0.01	0.14	-0.14	0.28	-0.26	1.00																		
Solar resources	-0.08	-0.16	-0.09	-0.10	-0.01	-0.29	0.02	-0.50	-0.12	0.13	1.00																	
Geothermal res.	0.02	0.04	0.14	0.05	0.08	0.09	0.33	0.12	0.19	-0.02	-0.17	1.00																
Biomass resources	-0.05	0.01	-0.04	-0.06	0.06	-0.01	-0.16	0.04	-0.08	0.19	0.03	-0.07	1.00															
Democracy	0.07	0.11	0.09	0.08	-0.28	0.02	0.06	0.19	0.33	-0.10	-0.24	0.17	0.07	1.00														
Pollution (SO_2)	0.01	0.01	0.00	-0.02	0.01	0.34	-0.15	0.28	-0.39	0.09	0.01	-0.02	-0.08	-0.09	1.00													
Civil society org.	0.04	0.02	0.06	0.08	-0.28	-0.50	0.5	-0.33	0.50	-0.26	0.00	0.19	-0.06	0.42	-0.26	1.00												
Veto players	0.12	0.09	0.05	0.08	-0.11	0.02	0.22	0.12	0.18	-0.09	-0.18	0.12	-0.05	0.60	-0.06	0.33	1.00											
EU member	0.10	0.17	0.10	0.04	-0.03	0.24	-0.15	0.26	-0.14	-0.06	-0.51	-0.07	-0.06	0.24	0.03	-0.12	0.22	1.00										
CEFTA	0.02	0.08	-0.01	0.06	0.00	0.13	-0.11	0.18	0.04	-0.15	-0.28	-0.07	-0.06	0.18	0.01	-0.02	0.07	-0.05	1.00									
Language	0.12	0.04	0.02	0.07	-0.05	-0.04	0.15	-0.10	0.11	-0.10	0.14	-0.06	-0.07	0.13	-0.02	0.12	0.04	-0.03	-0.07	1.00								
Neighbours	0.14	0.11	0.13	0.11	-0.08	0.11	-0.01	0.19	0.04	-0.03	-0.31	-0.02	0.03	0.15	-0.04	-0.03	0.01	0.19	0.27	0.16	1.00							
Tradebloc	0.12	0.16	0.13	0.11	-0.02	0.07	0.03	0.19	-0.04	0.00	-0.32	-0.03	-0.01	0.00	-0.03	-0.09	-0.07	0.30	0.03	0.19	0.54	1.00						
Common colony	0.03	0.1	0.00	0.05	-0.11	-0.08	-0.14	0.04	-0.14	0.08	-0.06	-0.17	-0.03	-0.19	-0.02	-0.08	-0.13	0.07	-0.13	0.19	0.23	0.54	1.00					
CDM projects	0.13	-0.01	0.12	0.13	-0.05	0.08	0.04	0.12	0.14	0.00	-0.03	0.11	-0.03	0.13	-0.01	0.13	0.05	-0.05	-0.05	0.17	0.11	0.17	0.03	1.00				
GEF funding	0.08	0.09	0.09	0.15	-0.04	0.00	0.16	0.11	0.10	-0.02	-0.09	0.12	-0.07	0.04	-0.06	0.13	0.05	-0.04	0.04	0.04	0.11	0.08	0.11	0.24	1.00			
Development aid	0.06	0.09	0.11	0.09	-0.05	-0.20	0.31	-0.04	0.33	-0.10	-0.11	0.15	0.01	0.23	-0.17	0.42	0.13	-0.01	0.11	0.11	0.14	0.13	-0.01	0.15	0.17	1.00		
Green Party	0.04	0.05	0.05	0.04	-0.03	-0.17	0.24	-0.03	0.15	-0.17	-0.29	0.10	0.04	0.31	-0.15	0.37	0.24	0.21	0.10	0.09	0.05	0.05	-0.06	-0.02	0.02	0.19	1.00	
Protected areas	-0.02	0.04	-0.00	0.03	0.02	0.12	0.10	0.02	0.21	-0.20	-0.00	0.17	0.01	0.25	-0.00	0.17	0.23	-0.03	-0.05	0.02	-0.07	-0.12	-0.16	0.12	0.02	0.12	0.11	1.00

Table S4a: Full models compared to parsimonious models (targets and feed-in tariffs)

	RE Targets (parsimonious model)		RE Targets (full model)		Feed-in-tariffs (parsimonious model)		Feed-in-tariffs (full model)	
	dy/dx[a]	SE[b]	dy/dx	SE	dy/dx	SE	dy/dx	SE
Domestic determinants								
Domestic energy[c]	-0.001	(0.001)	-0.001	(0.001)	-0.004**[d]	(0.001)	-0.003**	(0.001)
GDP per capita	0.001	(0.002)	0.000	(0.003)	0.008**	(0.002)	0.006*	(0.003)
Population	0.007***	(0.002)	0.006**	(0.002)	0.005**	(0.002)	0.004**	(0.002)
Education			0.010	(0.011)			0.002	(0.012)
Hydro resources	-0.004**	(0.002)	-0.003**	(0.002)	0.005**	(0.002)	0.005**	(0.000)
Wind resources	0.000**	(0.000)	0.000*	(0.000)	-0.000	(0.000)	-0.000	(0.003)
Solar resources	0.001	(0.003)	0.001	(0.002)	0.000	(0.004)	-0.000	(0.000)
Geothermal res.	-0.000	(0.000)	-0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
Biomass resources	-1.768	(1.178)	-1.923*	(1.064)	0.566*	(0.321)	0.566**	(0.280)
Democracy	0.000	(0.000)	0.000	(0.000)	0.001	(0.001)	0.000	(0.000)
Pollution (SO_2)			-0.000	(0.000)			0.000	(0.000)
Civil society org.			0.001	(0.002)			-0.000	(0.002)
Veto players	0.001	(0.001)	0.001	(0.001)	-0.001	(0.002)	-0.000	(0.001)
International determinants								
EU member	0.021**	(0.010)	0.019*	(0.010)	0.030**	(0.013)	0.037**	(0.016)
CEFTA	0.014	(0.009)	0.011	(0.008)	0.016	(0.010)	0.009	(0.008)
Common language			0.001	(0.006)			-0.010	(0.010)
Neighbours	0.010	(0.007)	0.008	(0.007)	-0.012	(0.010)	-0.004	(0.008)
Tradebloc			-0.002	(0.011)			-0.034*	(0.020)
Common colony	-0.004	(0.016)	-0.006	(0.014)	0.066**	(0.026)	0.061**	(0.027)
CDM projects	0.005	(0.003)	0.004	(0.003)	-0.002	(0.004)	0.001	(0.003)
GEF funding	0.005	(0.004)	0.003	(0.003)	0.006	(0.005)	0.005	(0.004)
Development aid	-0.004	(0.004)	-0.006	(0.004)	0.006	(0.005)	0.004	(0.004)
Year dummies	Yes		Yes		Yes		Yes	
N	1122		1122		938		938	
Years	12		12		10		10	
log likelihood	-137.7		-136.0		-109.6		-106.7	
AIC	333.4		340.0		273.2		277.5	
BIC	479.0		510.8		404.0		433.5	

a: dy/dx: Marginal effects at mean values of all other independent variables

b: SE: standard error

c: For these variables the 2009 values have been extrapolated

d: Significance levels: * = p-value <0.1, ** = p-value <0.05, *** = p-value <0.01

Table S4b: Full models compared to parsimonious models (financial incentives and framework policies)

	Financial incentives (parsimonious model)		Financial incentives (full model)		Framework policies (parsimonious model)		Framework policies (full model)	
	dy/dx[a]	SE[b]	dy/dx	SE	dy/dx	SE	dy/dx	SE
Domestic determinants								
Domestic energy[c]	-0.002	(0.001)	-0.002	(0.001)	-0.003	(0.004)	-0.003	(0.003)
GDP per capita	0.009**[d]	(0.003)	0.006	(0.004)	0.010	(0.008)	0.011	(0.010)
Population[c]	0.007***	(0.003)	0.007***	(0.003)	0.017***	(0.005)	0.014***	(0.005)
Education			0.013	(0.012)			0.029	(0.039)
Hydro resources	0.002	(0.002)	0.003	(0.002)	-0.006	(0.005)	-0.006	(0.005)
Wind resources	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
Solar resources	0.006*	(0.003)	0.007**	(0.004)	-0.008	(0.011)	-0.004	(0.011)
Geothermal res.	0.000	(0.000)	0.000**	(0.000)	-0.000	(0.001)	0.000	(0.000)
Biomass resources	-0.662	(1.029)	-0.562	(0.965)	-1.899	(2.158)	-2.368	(2.172)
Democracy	0.001*	(0.000)	0.001	(0.000)	0.002	(0.001)	0.001	(0.001)
Pollution (SO_2)			0.000	(0.000)			-0.001	(0.002)
Civil society org.			-0.001	(0.002)			0.007	(0.007)
Veto players	-0.002	(0.001)	-0.002	(0.001)	-0.001	(0.004)	-0.001	(0.003)
International determinants								
EU member	0.027**	(0.012)	0.032**	(0.016)	-0.014	(0.032)	-0.001	(0.033)
CEFTA	0.018*	(0.010)	0.018*	(0.009)	0.045	(0.030)	0.049*	(0.027)
Common language			0.001	(0.009)			-0.030	(0.028)
Neighbours	0.008	(0.008)	0.009	(0.008)	0.034	(0.024)	0.036	(0.024)
Tradebloc			-0.009	(0.015)			-0.016	(0.047)
Common colony	0.080**	(0.037)	0.074**	(0.036)	0.068*	(0.040)	0.068*	(0.037)
CDM projects	0.002	(0.003)	0.002	(0.003)	0.023	(0.017)	0.018	(0.017)
GEF funding	0.004	(0.004)	0.003	(0.004)	0.031*	(0.018)	0.025	(0.017)
Development aid	0.004	(0.005)	0.004	(0.005)	0.003	(0.015)	0.000	(0.013)
Year dummies	Yes		Yes		Yes		Yes	
N	941		941		864		864	
Years	10		10		12		12	
log likelihood	-110.1		-109.3		-185.7		-183.8	
AIC	274.2		282.5		429.3		435.6	
BIC	405.0		437.7		567.4		597.5	

a: dy/dx: Marginal effects at mean values of all other independent variables

b: SE: standard error

c: For these variables the 2009 values have been extrapolated

d: Significance levels: * = p-value <0.1, ** = p-value <0.05, *** = p-value <0.01

Table S5: Marginal effects when setting EU=0 and CEFTA=0 (parsimonious models)

	Targets		Feed-in-tariffs		Financial incentives		Framework policies	
	dy/dx[a]	SE[b]	dy/dx	SE	dy/dx	SE	dy/dx	SE
Domestic determinants								
Domestic energy[c]	-0.001	(0.001)	-0.003 **[d]	(0.001)	-0.001	(0.001)	-0.003	(0.003)
GDP per capita	0.001	(0.002)	0.006 **	(0.003)	0.007 **	(0.003)	0.010	(0.008)
Population[c]	0.006 ***	(0.002)	0.004 **	(0.002)	0.006 ***	(0.002)	0.016 ***	(0.005)
Hydro resources	-0.003 **	(0.002)	0.004 **	(0.002)	0.002	(0.001)	-0.005	(0.005)
Wind resources	0.000 **	(0.000)	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
Solar resources	0.001	(0.003)	0.000	(0.003)	0.005 *	(0.003)	-0.007	(0.011)
Geothermal res.	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)	0.000	(0.001)
Biomass resources	-1.464	(1.178)	0.463 *	(0.259)	-0.529	(0.831)	-1.854	(2.122)
Democracy	0.000	(0.000)	0.001	(0.000)	0.001	(0.000)	0.002	(0.001)
Veto players	0.001	(0.001)	-0.001	(0.001)	-0.001	(0.001)	-0.001	(0.004)
International determinants								
EU member	0.018 **	(0.010)	0.024 **	(0.010)	0.021 **	(0.010)	-0.014	(0.032)
CEFTA	0.011 *	(0.009)	0.013 *	(0.007)	0.015 **	(0.007)	0.044	(0.027)
Neighbours	0.008	(0.007)	-0.009	(0.008)	0.006	(0.006)	0.033	(0.023)
Common colony	-0.003	(0.016)	0.054 **	(0.021)	0.064 **	(0.030)	0.066 *	(0.038)
CDM projects	0.004	(0.003)	-0.002	(0.003)	0.002	(0.002)	0.022	(0.017)
GEF funding	0.004	(0.004)	0.005	(0.004)	0.003	(0.003)	0.030 *	(0.017)
Development aid	-0.003	(0.004)	0.005	(0.004)	0.003	(0.004)	0.003	(0.014)
Year dummies	Yes		Yes		Yes		Yes	
N	1122		938		941		864	
Years	12		10		10		12	
log likelihood	-137.7		-109.6		-110.1		-185.7	
BIC	479.0		404.0		405.0		567.4	

a: dy/dx: Marginal effects at mean values of all other independent variables, except EU and CEFTA set at 0.

b: SE: standard error

c: For these variables the 2009 values have been extrapolated

d: Significance levels: * = p-value <0.1, ** = p-value <0.05, *** = p-value <0.01

Table S6: Relative importance of domestic and international variables

	RE Targets (parsimonious model)		Feed-in-tariffs (parsimonious model)		Financial incentives (parsimonious model)		Framework policies (parsimonious model)	
	Domestic variables	Internatio-nal variab.	Domestic variables	Internatio-nal variab.	Domestic variables	Internatio-nal variab.	Domestic variables	Internatio-nal variab.
N	1122	1122	938	938	941	941	864	864
Pseudo R^2	0.24	0.13	0.19	0.18	0.24	0.16	0.14	0.12
log likelihood	-145.44	-166.43	-122.02	-122.41	-121.75	-133.12	-191.59	-196.66
AIC	334.87	370.86	284.03	278.83	283.50	300.24	427.18	431.32
BIC	445.38	466.30	380.91	361.17	380.44	382.64	531.94	521.79

Table S7: Coefficients when including diffusion variables separately in models

	RE Targets (parsimonious model)		RE Targets (full model)		Feed-in-tariffs (parsimonious model)		Feed-in-tariffs (full model)	
	dy/dx[a]	SE[b]	dy/dx	SE	dy/dx	SE	dy/dx	SE
Language	0.002	(0.007)	0.003	(0.006)	-0.019	(0.018)	-0.015	(0.017)
Neighbours	0.010	(0.007)	0.008	(0.006)	-0.021	(0.013)	-0.020	(0.013)
Tradebloc	0.003	(0.013)	0.002	(0.010)	-0.041	(0.026)	-0.043*[c]	(0.025)
Common colony	-0.003	(0.016)	-0.006	(0.013)	0.072***	(0.027)	0.074**	(0.029)
Colonizers[d]	0.004	(0.004)	0.005	(0.004)	-0.008	(0.006)	-0.008	(0.005)

	Financial incentives (parsimonious model)		Financial incentives (full model)		Framework policies (parsimonious model)		Framework policies (full model)	
	dy/dx	SE	dy/dx	SE			dy/dx	SE
Language	-0.002	(0.013)	0.000	(0.012)	0.004	(0.032)	-0.011	(0.027)
Neighbours	0.013	(0.010)	0.014	(0.010)	0.040*	(0.023)	0.020	(0.022)
Tradebloc	-0.008	(0.019)	-0.010	(0.018)	0.056	(0.049)	0.001	(0.047)
Common colony	0.084**	(0.037)	0.082**	(0.037)	0.087**	(0.039)	0.051	(0.037)
Colonizers[d]	0.008	(0.006)	0.009	(0.006)	[e]		[e]	

a: dy/dx: Marginal effects at mean values of all other independent variables

b: SE: standard error

c: Significance levels: * = p-value <0.1, ** = p-value <0.05, *** = p-value <0.01

d: Dummy whether adoption by colonizers

e: Data on adoption of framework policies by colonizers not available

Table S8: Coefficients when including further control variables in models

	RE Targets (parsimonious model)		Feed-in-tariffs (parsimonious model)		Financial incentives (parsimonious model)		Framework policies (parsimonious model)	
	dy/dx	SE	dy/dx	SE	dy/dx	SE	dy/dx	SE
Environmental preferences								
Green Party (dummy)	0.001	(0.004)	-0.000	(0.004)	0.002	(0.004)	-0.012	(0.014)
Protected areas[a]	-0.000	(0.000)	0.000	(0.000)	-0.000	(0.000)	-0.000	(0.000)
Environmental groups								
ENGOs[a]	-0.005	(0.004)	0.000	(0.001)	-0.003	(0.002)	-0.000	(0.004)
Greenpeace members	-0.008	(0.006)	-0.009	(0.006)	-0.002	(0.005)	-0.013	(0.023)
Energy dependence								
Diesel price[a]	0.004	(0.005)	0.015*	(0.008)	0.006	(0.008)	-0.008	(0.021)
Oil price[b]	0.000	(0.000)	0.000	(0.000)	-0.000	(0.000)	0.000	(0.001)
Unitary vs. federal states								
Unitary s. (dummy)	0.000	(0.004)	0.001	(0.005)	0.004	(0.003)	-0.005**	(0.003)
International diffusion								
EU (chang. over time)	0.017	(0.011)	-0.004	(0.011)	0.022*	(0.012)	-0.035	(0.047)
L1-3.GEF (dummy)	0.005	(0.004)	0.006	(0.005)	0.004	(0.004)	0.031*	(0.018)
GEF (dummy)	-0.005	(0.007)	0.001	(0.006)	-0.002	(0.007)	0.029	(0.021)
L1.GEF (dummy)	0.007	(0.005)	0.010	(0.006)	0.005	(0.005)	0.039	(0.024)
L2.GEF (dummy)	-0.004	(0.007)	-0.002	(0.007)	0.003	(0.005)	0.036	(0.026)
L3.GEF (dummy)	0.009	(0.006)	0.005	(0.007)	-0.002	(0.006)	-0.018	(0.037)
L4.GEF (dummy)	0.003	(0.008)	Predicts failure perf.		0.006	(0.007)	0.018	(0.040)
L5.GEF (dummy)	Predicts failure perf.		0.011	(0.010)	-0.010	(0.010)	Predicts failure perf	
L6.GEF (dummy)	0.016	(0.010)	0.017	(0.011)	0.005	(0.008)	Predicts failure perf	
L1-3.CDM (dummy)	0.005	(0.003)	-0.002	(0.004)	0.002	(0.003)	0.023	(0.017)
CDM (dummy)	0.011*	(0.006)	0.003	(0.006)	-0.003	(0.005)	0.035	(0.024)
L1.CDM (dummy)	0.003	(0.005)	-0.012	(0.011)	0.004	(0.006)	0.060**	(0.029)
L2.CDM (dummy)	0.013*	(0.007)	-0.003	(0.011)	-0.003	(0.006)	0.035	(0.040)
L3.CDM (dummy)	0.007	(0.008)	0.002	(0.003)	0.010	(0.008)	Predicts failure perf	

a: Reduces sample size, and data only for 2010 (is assumed to be the same in other years)

b: Here, year dummies are excluded but year (to proxy linear trend) is included

Table S9: Sample representativeness: Correlation and t-test results between included and excluded countries

	Year 1999 (most countries in dataset)		Year 2009 (last year of the dataset)	
	Correlation of inclusion dummy with variables [a]	p-value [b]	Correlation of inclusion dummy with variables [a]	p-value [b]
Target adoption	0.06	0.46	0.10	0.30
Tariff adoption	0.06	0.46	-0.03	0.77
Incentive adoption	[c]		0.03	0.71
Framework adoption	0.04	0.62	-0.11	0.36
Domestic energy	0.04	0.58	0.13	0.13
GDP per capita	-0.02	0.81	0.01	0.93
Population	0.55	0.00***	0.55	0.00***
Education	-0.07	0.38	-0.07	0.37
Hydro resources	0.01	0.88	0.01	0.88
Wind resources	-0.16	0.05*	-0.16	0.05*
Solar resources	-0.20	0.01**	-0.20	0.01*
Geothermal resources	0.11	0.20	0.11	0.20
Biomass resources	0.12	0.13	0.13	0.10
Democracy	0.11	0.24	0.00	0.97
Pollution (SO_2)	-0.11	0.17	-0.11	0.17
Civil society org.	0.42	0.00***	0.41	0.00***
Veto players	0.14	0.10	-0.10	0.24
EU member	0.12	0.12	0.12	0.12
CEFTA	0.01	0.93	0.01	0.92
Language	0.05	0.55	-0.01	0.94
Neighbours	0.15	0.05*	0.28	0.00***
Tradebloc	0.23	0.00***	0.17	0.03*
Common colony	-0.11	0.18	-0.30	0.00***
CDM projects	[c]		0.28	0.00***
GEF funding	0.13	0.10*	0.08	0.32
Development aid	0.29	0.00***	0.26	0.00***

a: pair-wise Spearman correlation coefficients
b: p-values for both Spearman correlation coefficients and t-test comparing the means of included and excluded countries; * = p-value <0.1, ** = p-value <0.05, *** = p-value <0.01
c: no correlation coefficient as variables have all value of zero in this year